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SUPPORT FOR AMENDMENTS

The amendments to the specification and to claim 102 were made solely to correct typographical and/or grammatical errors.

The amendments to independent claim 96 and to withdrawn independent claim 119 are fully supported by the description in the specification (e.g., paragraphs 7, 111, 137, and 153; etc.).

No new matter has been added. Upon entry of this Response, claims 96-118 are present and active in the application with claims 119-134 being presently withdrawn as non-elected.

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REMARKS

Applicants would like to thank Examiner Amelia Owens for the very courteous and helpful discussion held with their representative on June 29, 2006. The substance of this interview is summarized in the remarks below.

By way of introduction, the claimed invention relates to methods of performing asymmetric catalytic reactions. Since most molecules of life (e.g., DNA, proteins, etc.) and many pharmaceutical drugs are chiral (i.e., not superimposable on their mirror images or enantiomers), reactions that selectively produce one enantiomer of a chiral compound are important (e.g., specification, paragraph 108). As explained during the interview, asymmetric catalytic reactions enable the *direct* chemical synthesis of a desired enantiomer (as opposed to the separation of a desired enantiomer from a mixture of isomers prepared by non-asymmetric reactions). However, in conventional asymmetric catalytic reactions, the chemical catalysts that have been developed generally require metals and Lewis acids (e.g., specification, paragraphs 7, 118-120, and 153; etc.). As noted during the interview, the presence of metals in a catalyst is undesirable from the point of view of cost as well as safety; the presence of trace amounts of residual metals in a product may limit the pharmaceutical use of that compound due to strict federal regulations (e.g., specification, paragraph 7).

As explained during the interview, the claimed invention takes advantage of Applicants's discovery that hydrogen bonding—a relatively weak interaction that was rarely utilized as a force for promoting chemical reactions—can be used to catalyze a variety of asymmetric reactions (e.g., Diels-Alder reactions, hetero Diels-Alder reactions, 1,2-additions to carbonyl groups, etc.) with high levels of enantioselectivity (e.g., specification, paragraphs 107, 109, 153, and 154; etc.) and without requiring the presence of an undesirable metal.

Claim Rejections – 35 U.S.C. § 102

The rejection of claims 96-104 and 111-115 under 35 U.S.C. § 102(b) as being anticipated by *Jacobsen et al.* (U.S. Patent No. 6,130,340) has been obviated by amendment.

As presently written, independent claim 96 recites "a catalytic amount of a metal-free chiral hydrogen-bond donor," which is neither taught nor suggested in *Jacobsen et al.* On the contrary, *Jacobsen et al.* describes asymmetric cycloaddition reactions in which a chiral, nonracemic metal catalyst is used for enantioselective chemical synthesis (e.g., col. 7, ll. 10-13). All of the catalysts described in *Jacobsen et al.* require a metal—more specifically, a transition metal—and do not qualify as "metal-free chiral hydrogen bond donors," as required by independent claim 96.

Notwithstanding the failure of *Jacobsen et al.* to teach or suggest "a catalytic amount of a metal-free chiral hydrogen bond donor," as required by independent claim 96, *Jacobsen et al.* also clearly and expressly teaches away from the use of any type of metal-free catalyst, such that there would have been no motivation, teaching or suggestion to modify the catalysts described in *Jacobsen et al.* to prepare metal-free analogues (e.g., col. 2, ll. 19-43; col. 3, ll. 50-55; col. 4, l. 14; col. 7, ll. 10-13; col. 18, ll. 16-38; col. 18, ll. 40-43; col. 19, ll. 47-55; etc.). This express teaching away is clearly evident, for example, from a consideration of the following excerpt (col. 18, ll. 16-38):

For instance, a salient aspect of each of the catalysts contemplated by the instant invention concerns the use of metalloligands which provide a rigid or semi-rigid environment near the catalytic site of the molecule. This feature, through imposition of structural rigidity on the chelated metal, can be used to establish selective approach of the substrate to the catalytic site and thereby induce stereoselectivity and/or regioselectivity in a cycloaddition reaction. Moreover, the ligand preferably places a restriction on the coordination sphere of the metal.

Another aspect of the catalyst concerns the selection of metal atoms for the catalyst. In general, any transition metal (e.g., having d electrons) may be used to form the catalyst, e.g., a metal selected from one of Groups 3-12 of the periodic table or from the lanthanide series. However, in preferred embodiments, the metal will be selected from the group of late transition metals, e.g. preferably from Groups 5-12, in order to provide metal centers which are coordinatively unsaturated and not in their highest oxidation state. For example, suitable metals include Co, Cr, Mn, V, Fe, Mo, W, Ru and Ni. Particularly preferred metals are from group 6, especially Cr(III).

Since *Jacobsen et al.* contains no teaching or suggestion of "a catalytic amount of a metal-free chiral hydrogen-bond donor," as required by independent claim 96 and, moreover, clearly teaches away from the use of a metal-free catalyst, Applicants respectfully submit that the claimed invention is neither anticipated by nor would have been obvious in view of this reference. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Claim Rejections – 35 U.S.C. § 103

The rejection of claims 96-118 under 35 U.S.C. § 103(a) as being unpatentable over *Jacobsen et al.* and *Huang et al.* (*J. Am. Chem. Soc.*, **2002**, 124, 9662-9663) has been obviated.

As presently written, independent claim 96 recites "a catalytic amount of a metal-free chiral hydrogen-bond donor." As noted above, *Jacobsen et al.* contains no teaching or suggestion of "a metal-free-chiral hydrogen-bond donor."

Huang et al., as noted during the discussion, was published on the web on July 30, 2002—after the July 26, 2002 filing date of U.S. Provisional Application No. 60/398,696 to which the present application claims priority. Applicants note that the full contents of *Huang et al.* are contained in substantially identical format in the provisional application (see, for example, pages 1-7 of the provisional).

MPEP §706.02(V)(D) states that "[i]f the application properly claims benefit under 35 U.S.C. 119(e) to a provisional application, the effective filing date is the filing date of the provisional application for any claims which are fully supported under the first paragraph of 35 U.S.C. 112 by the provisional application."

Applicants respectfully submit that to the extent that the claimed invention is supported by the description in the provisional application (see, for example, pages 8-21 and claims 1-69 of the provisional), the present application is entitled to an effective filing date of July 26, 2002, such that *Huang et al.* is not available as prior art. To the extent that any subject matter recited in the claimed invention lacks verbatim support in the provisional application, Applicants respectfully submit that such subject

matter is likewise neither taught nor suggested in *Huang et al.* or *Jacobsen et al.*

For at least the reasons set forth above, Applicants respectfully submit that the claimed invention is neither anticipated by nor would have been obvious in view of *Jacobsen et al.* and *Huang et al.*, individually or in combination. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Claim Rejections – 35 U.S.C. § 112

The rejection of claims 96-118 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement is respectfully traversed.

Applicants respectfully submit that the claim terminology "first reactant," "second reactant," and "chiral hydrogen-bond donor" recited in independent claim 96 unequivocally satisfies the standard for compliance with written description set forth by the Office and by the courts.

In accordance with MPEP 2163.02, "[a]n objective standard for determining compliance with the written description requirement is, 'does the description clearly allow persons of ordinary skill in the art to recognize that he or she invented what is claimed.' *In re Gosteli*, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989).” In the present instance, Applicants claim a method of performing an asymmetric catalytic reaction in which “a catalytic amount of a metal-free chiral hydrogen-bond donor” is used to catalyze the reaction between first and second reactants to form an enantiomeric excess of a reaction product.

Applicants emphasize that the claimed methods are not dependent upon—and, therefore, should not be limited to—specific structures for the claimed first and second reactants or metal-free chiral hydrogen-bond donor, provided the reactants form the reaction product in an enantiomeric excess via catalysis by the metal-free chiral hydrogen-bond donor. As described in the specification, the practice of the claimed asymmetric catalytic method is not limited to a specific chemical reaction and, therefore, the use of functional terms such as “first reactant” and “second reactant” in the claims is justified. By way of example, representative chemical reactions described in the

specification include the Diels-Alder cycloaddition (e.g., paragraphs 140-153; etc.), the hetero Diels-Alder reaction (e.g., paragraphs 111-139; etc.), the 1,2-alkynylation of aldehydes (e.g., paragraphs 155-156; etc.), "dipolar cycloadditions, carbene additions, cyclopropanation, aziridination, additions of nucleophiles to carbonyl groups (e.g., by Grignard reagents, stannanes, silanes, organozincs, and other organometallics), addition of nucleophiles to alpha, beta-unsaturated carbonyls (e.g., by Grignard reagents, stannanes, silanes, organozincs, cuprates, organomanganese compounds, and other organometallics), nucleophilic addition to imines, cyanohydrin formation, cyanoamine formation, reductions of ketones and imines, and the like" (e.g., specification, paragraph 109).

Although the terms "first reactant," "second reactant," and "chiral hydrogen-bond donor" may be regarded as functional terms, Applicants note that "[t]here is nothing inherently wrong with defining some part of an invention in functional terms" and that "[f]unctional language does not, in and of itself, render a claim improper" (e.g., MPEP 2173.05(g), *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971)).

Moreover, in view of the description provided in the specification and the knowledge available in the art, one of ordinary skill in the art would certainly have recognized that Applicants were in possession of the claimed invention, and would have been able to practice the full scope of the claimed invention based on the teachings in the application.

For all of the reasons set forth above, Applicants respectfully submit that one of ordinary skill in the art would reasonably have concluded that Applicants were in possession of the claimed invention at the time of filing. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Withdrawn Claims

During the discussion, the Examiner indicated that non-elected claims drawn to subject matter related to that of active claims 96-118 might also be considered during the present examination.

Accordingly, Applicants respectfully submit that claims 119-134, which recite reaction mixtures of asymmetric catalytic reactions performed by a method such as that

recited in independent claim 96, are related in subject matter. For purposes of clarification, independent claim 119 was rewritten in a manner analogous to claim 119.

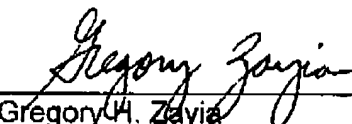
Consideration of withdrawn claims 119-134 is respectfully requested.

Conclusion

In view of the Amendment and Remarks set forth above, Applicants respectfully submit that the claimed invention is in condition for allowance. Early notification to such effect is earnestly solicited.

If for any reason the Examiner feels that the above Amendment and Remarks do not put the claims in condition to be allowed, and that a further discussion would be helpful, it is respectfully requested that the Examiner contact the undersigned agent directly at (312)-321-4257.

Respectfully submitted,



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